

# CLAIMS

1. A coating process apparatus for forming a coating film on a substrate to be processed, comprising:

5 a holding mechanism which holds the substrate to be processed in an approximately horizontal posture;

a coating liquid supply mechanism which supplies a predetermined coating liquid to a top surface of the substrate to be processed held by the holding mechanism;

10 a rotation mechanism which rotates the substrate to be processed held by the holding mechanism; and

an airflow control member laid out close to the substrate to be processed in such a manner as to surround a periphery thereof, and having a vertical cross section which gradually becomes thicker upward from an inside toward an outside.

2. A coating process apparatus for forming a coating film on a substrate to be processed, comprising:

a holding mechanism which holds the substrate to be processed in an approximately horizontal posture;

20 a coating liquid supply mechanism supplying a predetermined coating liquid to a top surface of the substrate to be processed held by the holding mechanism;

a rotation mechanism rotating the substrate to be processed held by the holding mechanism; and

25 a process container accommodating the holding mechanism and capable of exhausting an atmosphere around the substrate to be processed from a bottom, wherein

the process container includes:

a first cup having an outer circumferential wall surrounding an outside of the substrate to be processed; and

an airflow control member having a cross section of an  
5 approximately rectangular shape defined by an upper ring  
portion having a vertical cross section of an approximately  
triangular shape and protruding upward, and a lower ring  
portion having a cross section of an approximately  
triangular shape and protruding downward, and provided close  
10 to a periphery of the substrate to be processed in the first  
cup so as to surround an outer circumference of the  
substrate to be processed, wherein

an exhaust passage substantially exhausting an  
atmosphere around the substrate to be processed is provided  
15 between the airflow control member and the outer  
circumferential wall of the first cup, and wherein

a space between an apex of the upper ring portion and  
an upper end of the outer circumferential wall defines an  
atmosphere extraction port for the exhaust passage.

20 3. The coating process apparatus according to claim 2,  
wherein a base angle of an inside of the upper ring portion  
of the airflow control member is larger than or equal to 24  
degrees, but smaller than or equal to 34 degrees.

4. The coating process apparatus according to claim 2,  
25 wherein a height of the upper ring portion is greater than  
or equal to 10 mm, but less than or equal to 18 mm.

5. The coating process apparatus according to claim 2,

wherein a base angle of an inside of the lower ring portion included in the airflow control member is larger than or equal to 25 degrees, but smaller than or equal to 35 degrees.

6. The coating process apparatus according to claim 2,  
5 wherein the upper ring portion and the lower ring portion are integrated with each other.

7. The coating process apparatus according to claim 2,  
wherein the outer circumferential wall of the first cup includes a cylindrical vertical wall, and an inclined wall  
10 connected in a consecutive arrangement to an upper end of the vertical wall and inclined inwardly and upward.

8. The coating process apparatus according to claim 7,  
wherein the inclined wall is approximately in parallel with an outer inclined surface of the upper ring portion.

15 9. The coating process apparatus according to claim 8,  
wherein a protrusion for suppressing a counterflow of an airflow flowing into the exhaust passage is provided inwardly of an upper end portion of the inclined wall constituting the outer circumferential wall of the first cup.

20 10. The coating process apparatus according to claim 2,  
wherein the process container further includes a second cup having an inclined wall expanding obliquely downward and outward from below the substrate to be processed,

a drain passage which drains the coating liquid  
25 dispersed from the substrate downward is provided between the airflow control member and the inclined wall of the second cup, and a clearance between the airflow control

member and the substrate to be processed defines a drain port of the drain passage.

11. The coating process apparatus according to claim 10, wherein the second cup further includes a cylindrical  
5 vertical wall extending downward from a lower end of the inclined wall thereof, and

the exhaust passage and the drain passage are merged with each other at a clearance formed between the outer circumferential wall of the first cup and the vertical wall  
10 of the second cup, and exhausting and draining are carried out through a bottom of the process container.

12. The coating process apparatus according to claim 10, wherein the airflow control member is laid out in such a way that a vertex defined by mated inner edges of the upper  
15 and lower ring portions is higher than a position of the top surface of the substrate to be processed, so that the coating liquid dispersed from the substrate to be processed substantially strikes an inner inclined wall of the lower ring portion to be guided to the drain passage.

20 13. The coating process apparatus according to claim 10, wherein the airflow control member is provided in such a way that a vertex defined by mated inner edges of the upper and lower ring portions is higher than a position of the top surface of the substrate to be processed, so that the  
25 airflow flowing in a vicinity of the periphery of the substrate to be processed substantially ascends along an inner inclined wall of the upper ring portion and flow into

the exhaust passage via the atmosphere extraction port.

14. A coating process apparatus for forming a coating film on a substrate to be processed, comprising:

a holding mechanism which holds the substrate to be processed in an approximately horizontal posture;

a coating liquid supply mechanism which supplies a predetermined amount of a coating liquid to a top surface of the substrate to be processed held by the holding mechanism;

a rotation mechanism which rotates the substrate held by the holding mechanism; and

a process container which accommodates the holding mechanism and capable of exhausting an atmosphere around the substrate from a bottom, wherein

the process container includes:

a first cup having an outer circumferential wall surrounding an outside of the substrate to be processed; and

an airflow control member including an upper ring portion having a vertical cross section of an approximately triangular shape and protruding upward, and a lower ring portion including a first inclined portion inclined outward and downward from an inner apex of the upper ring portion by a predetermined length, a horizontal portion horizontally extending outward from a lower end of the first inclined portion, and a second inclined portion inclined outward and downward from the horizontal portion, and provided close to a periphery of the substrate to be processed in the first cup so as to surround an outer circumference of the

substrate to be processed,

an exhaust passage substantially exhausting an atmosphere around the substrate to be processed is provided between the airflow control member and the outer circumferential wall of the first cup, and

a space between an apex of the upper ring portion and an upper end of the outer circumferential wall defines an atmosphere extraction port for the exhaust passage.

15. A coating film forming method comprising the steps of:

holding a substrate to be processed in an approximately horizontal posture;

adjusting positions of an airflow control member of an approximately ring shape and the substrate relatively to each other in such a manner that the airflow control member is arranged close to a periphery of the substrate to be processed and surrounds the periphery of the substrate to be processed, the airflow control member having a vertical cross section which gradually becomes thicker upward from an inside toward an outside; and

forming a coating film on the substrate to be processed by supplying a predetermined coating liquid to a top surface of the substrate to be processed and rotating the substrate to be processed so as to spread the coating liquid over the entire substrate to be processed.

16. The coating film forming method according to claim 15, wherein the airflow control member in use has a cross

section of an approximately rectangular shape defined by an upper ring portion having a vertical cross section of an approximately triangular shape and protruding upward, and a lower ring portion having a vertical cross section of an approximately triangular shape and protruding downward,

at the step of adjusting the positions of the substrate to be processed and the airflow control member, the substrate to be processed and the airflow control member are accommodated in a process container having an outer circumferential wall which surrounds an outside of the substrate to be processed and capable of exhausting from a bottom thereof, and

at the step of forming the coating film by rotating the substrate to be processed, an atmosphere over the substrate coat is taken in the process container from between the airflow control member and the outer circumferential wall.

17. The coating film forming method according to claim 16, wherein at the step of adjusting the positions of the substrate and airflow control member, the airflow control member is laid out in such a way that a vertex defined by mated inner edges of the upper and lower ring portions is higher than a position of the top surface of the substrate to be processed.